Noatak River Test Fishing Project, 1988

by

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INTRODUCTION

A set gill net test fishing project in the lower Noatak River was initiated in 1975 (Cunningham 1976) and continued through 1978. Test fishing continued at a different location from 1979 (Bird 1980) through 1983 in conjuction with a side scan sonar project, and in 1984 with a Biosonics sonar project (Figure 1). No projects were operated in 1985 or 1986. Although initial site feasibility studies for a drift test fishery in the lower Noatak River were conducted in 1984, project funding was not made available until 1987.

Current management of the Kotzebue commercial salmon fishery is dependent mainly on comparing period and cumulative season catch and catch rates to prior years catches. The drift test fishing project was initiated because of its relatively low cost and the need for an inseason escapement index. If the project is continued it will assist with fisheries management by providing an index of chum salmon migration timing and escapement to the Noatak River, the largest salmon producing system in the Kotzebue area.

The objectives of the test fishing project were as follows:

1. Evaluate the feasibility of indexing chum salmon escapement in the Noatak River using systematic drift gill net catches.

2. Describe the migratory timing for chum salmon escapement.

3. Estimate the age composition of the Noatak River chum salmon escapement.

4. Assess the impact of the Kotzebue District commercial salmon fishery on overall chum salmon abundance in the lower Noatak River.

Methods

Site Description

The present test fishing site was selected because of its desirable stream characteristics and proximity to the Kotzebue commercial salmon fishery (Figure 1). The site consisted of a 0.5 mile river section located approximately 9 miles upstream from the commercial salmon fishing district boundary markers near the

mouth of the Noatak River. The river essentially runs through a single channel at that location, which allowed drift gill nets to be deployed across the entire width.

The width of the river was approximately 1,000 feet, and was divided into three stations (Figure 2). Station A designated the western third, which included the deepest portion of the channel and had the steepest bank (Figure 3). The depth of the channel increased from the upper end to the lower end of the drift area (27 to 40 feet). The lower half of this station contained a considerable amount of submergent vegetation near the shore to a depth of 6 feet or more. Station B, located at the middle of the river, had a relatively even bottom profile with a depth of 19-21 feet. In section C, the eastern third of the river, the depth gradually dropped from 3 feet nearshore to 19 feet offshore. This station possessed the slowest current.

Test Fishing

Fishing was scheduled to sample salmon escapement during three different segments of the day; late morning, mid-day, and late evening. A series of three drifts (one at each station) was conducted during each time period, at approximately 1200, 1800, and 2400 hours, respectively. The 2400 hour drift was recorded as the number three drift, even though it may have actually ocurred the following day. All drift time periods were shifted forward an hour or two during the season to adjust to decreasing daylight. Drifts were conducted by a two person crew, six days a week.

All test fishing drifts were made from a 17 foot whaler for approximately 20 minutes with a 50 fathom gill net. The net was composed of 5 7/8" stretched mesh multifilament webbing, 45 meshes deep, and hung at a ratio of 2:1. All fish caught were tallied by species, with most salmon sold during commercial fishing periods. Scales were collected for age composition data from all salmon caught. Sex and size data were not collected in an effort to minimize handling mortality. During commercial closures all healthy fish were released and any mortalities were given away.

Standardized Catches

Actual catches were converted to catch per unit of effort (CPUE) by considering fishing time and the length of net used. Each CPUE index (I) was the number of fish which would have been caught if 100 fathoms of net had been fished for 60 minutes. The index was computed as follows:

$$I = \frac{6{,}000(C)}{(L)\ (T)}$$

Where C is the number of chum caught, L is the length of net used

(fathoms), and T is the mean fishing time (minutes). Mean fishing time was defined as the amount of time the entire net was fishing plus half the time it took to set and retrieve the net. Specific station catches were combined into an average drift time period CPUE index which was calculated by weighting the catch information from each station equally. Mean drift CPUE indices were summed to produce cumulative and total seasonal CPUE indices for the period of data collection. Cumulative proportions of seasonal total test fish CPUE indices were also calculated.

Seasonal abundance by station was indexed by summing specific CPUE indices at each station across all time periods fished. Temporal and spatial distribution was described as a percent calculated by using seasonal mean CPUE rather than total CPUE indices, since the number of drifts made at each station and time period varied. No interpolations were made for missing data.

Results and Discussion

1988 Test Fish Results

Drifting began on 19 July and continued through 25 August, 1988. During that time 1409 chum salmon were caught in a total of 243 station drifts (83 drift time periods) producing 2202.50 chum salmon CPUE index points (Table 1 and Figure 4).

Peak catches occurred on 11-12 August, comprising 18.1% (398.28 CPUE indices) of the total CPUE indices. The peak drift occurred on 12 August at 1200 which produced a CPUE of 133.87.

Three peak catch periods were observed, each of which lasted for 5 drifts (or represented approximately 39 hours each). The first peak occurred 3-4 August and comprised 16.8% of the total seasonal CPUE indices. The second peak occurred 11-12 August and comprised 18.1% of the total; and the third peak was on 18-19 August comprising 17.8% of the total. The combined CPUEs of the three peaks represent 52.7% of the total seasonal CPUE indices.

A total of 37.6, 33.9 and 28.5 percent of the seasonal CPUE indices was caught at 1200, 1800, and 2400 hours, respectively (Table 2).

A total of 44.8, 16.4, and 38.8 percent of the total seasonal CPUE indices was caught at stations A, B, and C, respectively (Table 3).

Scales were analyzed from 1,259 chum salmon caught in test nets. The age composition was 11.5, 72.0, 14.8, 1.5, and 0.2 percent age 3, 4, 5, 6, and 7, respectively (Table 4). The age composition was similar to that of the Kotzebue commercial catch except that the percent of age 3 fish was 1.8 times higher in the

test net catch (Table 5).

Of the 1,409 chum salmon caught in test nets, 1,127 (80%) were sold, 164 (11.6%) released in good condition, and 118 (8.4%)were intended for release but did not survive. Mortalities were given to elderly residents of Kotzebue and charitable organizations (Senior Citizen Center, Women's Crisis Shelter, Group Home, Prematernal Home, Day Care Center, etc.).

A total of 11 char was also caught (Table 6). The first char appeared on 5 August, but most (81.8%) were caught after 17 August, and comprised 2.3% of the total combined species catch after that date. One pink salmon was caught on 21 August.

For comparative purposes, the basic fishing operation, gear, location and timing did not change from 1987. However, fishing started 5 days earlier and ended 2 days earlier in 1988. A total of 5 days of test fishing were missed due to regular days off, and 2 days were missed due to strong winds which prevented the crew from returning to camp. In addition, a total of 10 drift periods and 7 station drifts were missed, mostly due to strong winds or floating debris.

The water level remained high during most of August. Climatological data is presented in Table 7.

1987-1988 Comparisons

The 1988 test net data may represent an average chum salmon escapement as indicated by aerial survey information. The 1988 Kotzebue commercial catch statistics also compare with the previous 7-year average return. However, several factors must be considered when analyzing the data.

Revised 1987 mean CPUE indices are presented in this report to replace original data, and for comparison to 1988 data (Tables 8, 9, 10 and Figure 5). The values were recalculated, weighting CPUE information from each station equally to better represent individual station drifts.

There are some similarities between the two years, such as total seasonal mean CPUE indices (1853.8 in 1987 and 2202.5 in 1988) and peak CPUE day. However, the comparability of this year's data to that of 1987 may be affected by the following:

1) Difference in migratory timing
2) Test fishing technique (including timing of drifts and missed drifts in relation to commercial fishing periods)
3) Weather conditions and salmon migration patterns

The 1987 and 1988 commercial catch was 109,467 and 352,915 chum salmon, respectively. The 1987 return was poor enough to warrant

period closures, which consequently had an effect on test net catches. There were 6 fishing periods for a total of 204 hours of commercial fishing during the 1987 test fishing season, and 12 periods for a total of 402 hours of commercial fishing during the 1988 test fishing season. The 1987 commercial fishing season consisted of approximately half the hours of the 1988 season (that portion which coincided with the test fishery). Consequently, the 1987 test fishery produced 84% of the total 1988 CPUE indices. However, the 1987 test fishing season also consisted of 15 more station drifts. The mean catch per 100 fathom hour for the entire season was 21.3 and 26.5 chum salmon in 1987 and 1988, respectively. The 1987 mean was 80% of the 1988 mean.

The removal of a considerable number of fish by the commercial fishery is evident in the behavior of the test fishing CPUE data (Figure 4). Abrupt decreases in test net catches followed several commercial periods. Catches of 0 fish occurred only during commercial fishing periods in 1988 (4 periods). However, decreased test net catches could not be attributed solely to commercial harvest removal in 1987. Considerable flucuation in test net catches was observed during commercial period closures (Table 5). Generally, the length of influence corresponded to the length of the commercial period. There was a variable amount of lag time for the fish which had been exposed to the commercial fishery to reach and pass the test net site. This lag time was slightly longer (a less immediate response) in 1988, probably due to the elimination of commercial fishing near the Noatak River mouth.

The timing of test net drifts (and missed drifts) in relation to commercial periods must also be considered. The number of CPUE indices reaching the test net site during several missed drifts is unknown. Depending on concurrent commercial fishing period openings or closures, the number could vary significantly, which makes interpolation difficult. The total number of CPUE indices generated is influenced by the scheduling of drifts and days off in relation to commercial fishing periods.

The two stock nature of the commercial fishery vs the single stock of the test fishery may be evident when comparing this year's test net catch to the commercial catch (Figure 4). Commercial periods during 19-31 July produced commercial CPUEs similar to those during 1-12 August (although the actual catch was slightly higher in August), yet test fish CPUEs were much higher during the later time period. A total of 9.4 and 54.5 percent of the total test fish CPUE indices were produced during the 19-31 July and 1-12 August time periods, respectively. This indicates that the majority of the Noatak return had not begun until August, and further suggests that the component of the commercial harvest caught in July is largely of Kobuk River origin. A total of 36.1% of the seasonal CPUE indices was

produced 15-25 August.

However, commercial catches early in the season were considerably above average. Whether this was due in part to an early return, fish being caught sooner in the extended area (Riley Creek), or greater abundance of fish, is not entirely known. These factors may also have influenced the timing of test net CPUE indices.

An absence of data from missed drifts and the discontinuous salmon migration patterns thought to exist in the Kotzebue fishing district make it difficult to evaluate the effects of commercial harvest on escapement.

The 1987 data may indicate the proportion of escapement which occurred during one or more commercial period closures (relative to the rest of that year). Approximately 29.3% of the total 1987 test fish CPUE indices were generated during the July portion (which included a week long closure), compared to 9.4% in 1988 (Figure 5). This could also indicate the relative proportion of the Kobuk escapement which took place during that same time. Since this time period is before the main Noatak portion of the return and probably encompassed the Kobuk peak, it could be assumed that a higher percentage of the Kobuk escapement occurred during that same time.

Approximately 56.2 and 14.5 percent of the total 1987 test fish CPUE indices were produced during the 1-12 August and 13-27 August time periods, respectively. Slightly over 50% of the total CPUE indices were generated from 1-12 August during both years. All percentages were calculated from mean CPUE indices to adjust for the variable number of individual station drifts.

It is interesting to note that 50% of the total CPUE index had been reached by approximately the same date (9 August) in both years, even though fishing dates and number of drifts differed (Figures 6 and 7 and Tables 11 and 12). Fifty percent of the 1988 commercial harvest had already been caught by 2 August, reflecting the Kobuk component of the fishery, in addition to the later starting date and lag time to the test fishing site (Figure 8). By 12 August, approximately 70% of the total season test fishing CPUE index had been achieved in 1988 (80% in 1987), after which time a management action would have had little effect on escapement.

The higher percentage of age 3 fish caught in the test net (when compared to the commercial catch) could be due to several reasons. The age composition of the salmon population reaching the test net had been altered by commercial gear removing a certain size and age. The test net sampled that portion of the salmon population not caught by commercial gear. While the test net captured fish from only the Noatak stock, the commercial fishery harvested fish from 2 stocks (Kobuk and Noatak). The test

net was of 5 7/8" mesh, and the commercial fleet used 5 7/8" and 6 " mesh, the proportion of each unknown. In addition, drifting may be a more efficient means of capturing fish in that the net is tended more often allowing fewer small fish to escape.

Management Considerations

Noatak River test fish information can be used by management as an indicator of the relative abundance of Noatak River chum salmon. The test fish CPUE provide a tool for assessing the chum salmon run timing into the Noatak River and out of the Kotzebue district gill net fishery, and may be used as a guide for making inseason adjustments of commercial fishery openings.

The length of the commercial fishery openings in July are dependent upon the abundance and susceptibility to capture of Kobuk bound chum salmon. By monitoring the Noatak test fish CPUE data, the management biologist may be able to judge when management actions are no longer affecting the Kobuk stock, but primarily the Noatak stock. With a larger data base and good aerial survey information it may be possible to more precisely evaluate the extent to which the commercial harvest affects escapement.

LITERATURE CITED

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Table 1. Noatak River drift test fishing catch and mean CPUE by drift, 1988. 1/

Date	Drift	Catch	Mean CPUE
719	1	5	8.69
719	2	2	3.55
719	3	3	5.11
720	1	20	33.36
720	2	12	19.76
720	3	4	6.81
721	1	1	1.74
721	2	8	13.10
721	3	1	1.70
722	1	0	0.00
722	2	0	0.00
722	3	3/	0.00
723	1	1	1.78
723	2	1	1.70
723	3	19	32.44
724	1	2/	
724	2	2/	
724	3	2/	
725	1	7	11.99
725	2	3	5.00
725	3	9	14.08
726	1	3	5.22
726	2	2	3.26
726	3	1	1.90
727	1	0	0.00
727	2	1	1.70
727	3	0	0.00
728	1	9	15.58
728	2	8	12.44
728	3	0	0.00
729	1	2/	
729	2	2/	
729	3	2/	
730	1	3/	
730	2	3/	6.67
730	3	3/	
731	1	3/	
731	2	3/	
731	3	4	6.82
801	1	34	50.47
801	2	28	43.18
801	3	22	34.24
802	1	4/	16.00
802	2	11	16.69
802	3	21	29.94

-Continued-

Table 1. (p. 2. of 3)

Date	Drift		Catch	Mean CPUE
803	1		27	39.07
803	2		50	83.07
803	3		46	58.14
804	1		41	59.61
804	2		54	82.80
804	3		61	85.84
805	1		35	57.90
805	2		30	48.29
805	3		19	32.38
806	1	2/		
806	2	2/		
806	3	2/		
807	1	3/		
807	2	3/		
807	3	3/		
808	1		32	50.23
808	2		19	33.04
808	3		20	32.51
809	1		3	5.25
809	2		0	0.00
809	3		1	1.78
810	1		1	1.82
810	2		3	5.18
810	3		15	14.31
811	1		30	45.89
811	2		31	57.60
811	3		48	87.54
812	1		81	133.87
812	2		50	73.38
812	3		13	18.55
813	1	2/		
813	2	2/		
813	3	2/		
814	1	3/		
814	2	3/		
814	3	3/		
815	1	3/		
815	2		13	21.38
815	3	3/		
816	1		5	8.70
816	2	3/		13.33
816	3	3/		
817	1		17	25.64
817	2		1	1.70
817	3		15	24.91
818	1		59	86.57
818	2		62	87.67
818	3		56	73.16

-Continued-

Table 1. (p. 3 of 3)

Date	Drift		Catch	Mean CPUE
819	1		45	69.18
819	2		48	75.17
819	3		7	11.89
820	1	2/		
820	2	2/		
820	3	2/		
821	1	4/		
821	2		26	40.22
821	3		20	33.87
822	1	4/		
822	2		6	10.33
822	3		3	7.45
823	1		11	19.40
823	2		6	10.71
823	3		7	11.99
824	1		13	21.02
824	2		7	14.03
824	3		3	5.41
825	1		6	10.55
825	2	4/		
825	3		3	5.25

1/ Mean CPUE is calculated from the CPUE of 3 individual stations per drift

2/ No fishing - regular day off

3/ No fishing entire drift or 1 or 2 stations - weather

4/ No fishing entire drift or 1 or 2 stations - other

Table 2. Noatak River seasonal test fishing CPUE indices, mean CPUE, and percent by drift period (time of day), 1988.

Drift Period	CPUE Indices	No. Drift Periods	Seasonal Mean CPUE 1/	%
1 (1200)	779.53	26	29.98	37.55
2 (1800)	784.95	29	27.07	33.91
3 (2400)	638.02	28	22.79	28.54
Total	2202.50	83	26.61	100.00

1/ Calculated by weighting CPUE informaion from each drift time period equally.

Table 3. Noatak River seasonal test fishing CPUE indices, mean CPUE, and percent by station, 1988.

Station	CPUE Indices	No. Station Drifts	Seasonal Mean CPUE 1/	%
A	2996.50	83	36.10	44.83
B	1055.88	80	13.20	16.39
C	2498.20	80	31.23	38.78
Total	6650.58	243	26.84	100.00

1/ Calculated by weighting CPUE information from each station equally.

Table 4. Age composition of Noatak River drift test net catches, 1988.

Date	Sample Size	Cum. Sample	Age by Week 0.2 #	0.2 %	0.3 #	0.3 %	0.4 #	0.4 %	0.5 #	0.5 %	0.6 #	0.6 %
7/19-7/23	61	61	0	0.0	37	60.7	19	31.1	4	6.6	1	1.6
7/25-7/29	37	98	0	0.0	29	78.4	6	16.2	2	5.4		
7/30-8/05	469	567	31	6.6	358	76.3	72	15.4	7	1.5	1	0.2
8/08-8/12	303	870	29	9.6	228	75.2	41	13.5	5	1.7		
8/15-8/19	289	1159	64	22.2	190	65.7	34	11.8	1	0.3		
8/21-8/25	100	1259	21	21.0	64	64.0	15	15.0	0	0.0		

Date	Sample Size	Cum. Sample	Cumulative Age 0.2 #	0.2 %	0.3 #	0.3 %	0.4 #	0.4 %	0.5 #	0.5 %	0.6 #	0.6 %
7/19-7/23	61	61										
7/25-7/29	37	98	0	0.0	66	67.4	25	25.5	6	6.1	1	1.0
7/30-8/05	469	567	31	5.5	424	74.8	97	17.1	13	2.3	2	0.3
8/08-8/12	303	870	60	6.9	652	74.9	138	15.9	18	2.1	2	0.2
8/15-8/19	289	1159	124	10.7	842	72.7	172	14.8	19	1.6	2	0.2
8/21-8/25	100	1259	145	11.5	906	72.0	187	14.8	19	1.5	2	0.2

Table 5. Percent age and sex composition of chum salmon taken in the Kotzebue commercial chum salmon fishery, 1962-1988.

Year	Sample Size	Percent Males	Percent Females	Percent Age Class 0.2	0.3	0.4	0.5
1962	69	26.1	73.9	7.3	63.3	28.0	1.4
1963	255	35.0	65.0	30.1	50.9	18.6	0.4
1964	463	43.6	56.4	53.3	45.1	1.7	0.0
1965	480	42.1	57.9	2.3	91.0	6.7	0.0
1966	430	40.2	59.8	10.1	67.1	22.8	0.0
1967	1865	37.3	62.7	8.8	72.3	18.5	0.5
1968	1989	48.2	51.8	21.2	58.0	19.8	0.9
1969	1125	53.7	46.3	36.8	58.3	4.9	0.0
1970	267	45.3	54.7	3.9	91.0	5.1	0.0
1971	1105	54.6	45.4	7.1	67.3	26.3	0.0
1972	980	50.9	49.1	15.8	59.4	24.1	0.6
1973	598	46.0	54.0	16.7	69.5	13.8	0.0
1974	350	47.1	52.9	28.5	63.5	7.8	0.2
1975	340	46.4	63.6	2.5	86.9	10.7	0.0
1976	566	47.9	52.1	11.2	51.6	37.2	0.1
1977	446	49.3	50.7	6.7	73.0	18.6	1.7
1978	579	49.9	50.1	10.5	57.5	31.8	0.2
1979	658	53.3	46.7	30.6	53.2	15.2	1.0
1980	710	56.4	43.6	15.1	78.1	6.6	0.2
1981	1167	52.4	47.6	2.4	67.1	30.6	0.0
1982	983	48.8	51.2	5.9	48.3	40.3	5.5
1983	1979	43.4	56.6	5.8	57.8	34.2	2.3
1984	2933	50.2	49.8	14.6	64.3	19.7	1.3
1985	3293	47.8	52.2	0.4	83.7	15.5	0.4
1986	3095	46.0	54.0	0.3	18.6	78.9	2.2
1987	1987	52.0	48.0	15.0	43.0	31.0	11.0
1988 2/	3324	48.0	52.0	6.5	74.9	16.8	1.7
Mean 1/	985	46.5	53.9	14.5	65.8	19.1	0.7

1/ Historic mean for years 1962-1985.

2/ Includes 0.1% age 7.

Table 6. Noatak River drift test fishing char catch, 1987-1988.

Date	Drift	1987	1988	
8/05	3		1	
8/08	3		1	
8/11	3	1		
8/18	1		1	
8/18	2	1		
8/18	3		2	
8/19	2		2	
8/19	3	1		
8/20	1	2		
8/21	2	1	1	
8/22	1	1		
8/22	2	3	1	
8/22	3	3		
8/24	2	2	2	1/
8/25	2	2		
8/26	1	1		
8/26	2	5		
8/26	3	1		
8/27	1	4		
8/27	2	3		
8/27	3	2		
Total		33	11	

1/ Last day of fishing, 1988

Table Noatak River drift site climatological data, 1988.

Date	Time	Water Level (in.)	Secchi (ft.)	Wind (mph)	Cloud Cover 1/	PPT 2/	Water Temp (F)
7/19	1200		6.0	SW 12	1	7	
	1800		6.0	SW 8	1	7	
	2400		4.7	N 4	2	7	
7/20	1200		6.5	N 14	3	7	
	1800		7.5	N 5	1	7	
	2400		7.0	N 6	1	7	
7/21	1200	15	8.0	SW 8	1	7	
	1800	14	7.5	SW 16	1	7	
	2400	13	7.5	SW 3	1	7	
7/22	1200	17	10.0	N 3	1	7	
	1800	17	7.5	SW 14	1	7	
	2400	17	8.0	NE 18	1	7	
7/23	1200	11	9.0	NE 4	1	7	
	1800	11	9.0	SW 10	1	7	
	2400	12	8.0	NE 3	2	7	
7/25	1200	20	9.0	N 12	2	7	
	1800	25	7.0	W 8	4	7	
	2400	24	9.0	W 3	4	7	
7/26	1200	31	10.0	SW 10	4	7	
	1800	33	10.0	SW 14	4	7	
	2400	33	9.5	NE 5	4	7	
7/27	1200	31	8.3	S 5	4	1	
	1800	26	9.5	SW 10	4	-	
	2400	30	9.0	SW 3	4	-	
7/28	1200	30	10.0	SW 10	-	-	
	1800	25	11.0	0	1	7	
	2400	23	9.5	N 7	-	7	
7/30	1200	35	-	-	-	-	
	1800	37	10.0	S 20	4	-	
	2400	40	-	SW 25	-	-	
7/31	1200	50	-	SW 25	4	1	
	1800	-	-	-	4	-	
	2400	42	9.5	S 10	4	-	
8/01	1200	33	5.5	SW 3	4	-	
	1800	29	3.3	SW 3	4	-	
	2400	34	3.0	N 3	4	-	
8/02	1200	40	1.5	S 8	4	-	
	1800	38	0	SW 5	1	-	
	2400	40	0	SW 5	1	-	
8/03	1200	40	0	S 10	4	-	
	1800	35	0	SW 5	4	-	
	2400	34	0	SW 1	4	-	
8/04	1200	32	0	SW 1	1	7	
	1800	32	0	SW 1	1	7	
	2400	-	0	NW 3	1	7	
8/05	1200	29	0	- -	1	7	
	1800	28	0	SE 10	1	7	
	2400	26	0	0	2	7	
8/08	1200	27	2.5	N 8	1	7	53
	1800	26	3.0	N 5	2	7	
	2400	32	2.7	SW 1	1	7	

Date	Time	Water Level (in.)	Secchi (ft.)	Wind (mph)	Cloud Cover 1/	PPT 2/	Water Temp (F)
8/09	1200	33	3.2	SW 10	4	7	52
	1800	33	3.5	SW 6	1	7	53
	2400	36	3.5	0	2	7	52
8/10	1200	32	3.5	E 10	4	7	52
	1800	31	3.2	E 15	4	2	52
	2400	34	3.0	E 12	4	2	52
8/11	1200	36	3.0	N 8	4	2	52
	1800	33	3.0	N 20	4	-	52
	2400	37	3.0	N 10	3	-	52
8/12	1200	36	2.0	W 1	4	-	52
	1800	30	2.0	0	2	-	52
	2400	38	2.5	E 1	4	-	52
8/15	1200	-	-	-	-	-	
	1800	52	0.7	S 15	4	2	52
	2400	-	-	-	-	-	
8/16	1200	52	0.7	S 5	4	-	50
	1800	50	0.7	SE 12	3	-	52
	2400	47	-	S 8	4	-	
8/17	1200	52	0.5	S 12	3	1	50
	1800	52	0.5	S 8	1	-	52
	2400	51	0.5	0	1	-	50
8/18	1200	50	0.7	N 8	1	7	52
	1800	47	0.7	N 5	2	7	51
	2400	46	0.7	0	2	7	53
8/19	1200	45	0.7	0	3	7	50
	1800	45	0.8	S 10	2	7	50
	2400	43	0.8	S 5	3	7	53
8/21	1200	-	-	-	-	-	
	1800	38	0.8	S 15	4	-	53
	2400	37	1.2	S 8	4	-	53
8/22	1200	-	-	-	-	-	
	1800	32	2.0	SE 10	4	-	53
	2400	30	2.0	SE 5	4	-	53
8/23	1200	29	2.0	N 2	4	-	52
	1800	29	2.0	S 10	4	-	52
	2400	32	2.0	S 8	4	-	52
8/24	1200	31	2.0	E 12	4	-	48
	1800	32	2.0	SE 18	4	2	48
	2400	33	2.0	E 10	4	-	48
8/25	1200	36	2.0	NE 10	3	-	48
	1800	-	-	-	-	-	
	2400	35	2.0	NE 12	4	-	48

1/ Cloud cover
- No observation made
1 Clear sky; less than 1/10 cloud cover
2 Cloud cover not more than 1/2
3 Cloud cover more than 1/2
4 Completely overcast
5 Fog or thick haze

2/ Precipitation (ppt)
- No observation made
1 Intermittent rain
2 Continuous rain
3 Snow
4 Snow and rain mix
5 Hail
6 Thunderstorm
7 No precipitation

Table 8. Noatak River drift test fishing catch and mean CPUE by drift, 1987. 1/

Date	Drift	Chum Catch	Mean CPUE
723	2	2	3.3
723	3	6	11.7
724	1	0	0.0
724	2	5	10.3
724	3	0	0.0
725	1	36	48.3
725	2	3	6.2
725	3	9	32.7
726		2/	
726		2/	
726		2/	
727	1	19	27.7
727	2	29	35.1
727	3	33	51.9
728	1	6	15.1
728	2	5	11.8
728	3	7	16.0
729	1	3	8.0
729	2	13	27.6
729	3	5	11.9
730	1	17	40.0
730	2	24	32.0
730	3	3/	
731	1	8	20.5
731	2	0	0.0
731	3	14	28.1
801	1	11	22.0
801	2	3	8.0
801	3	2	5.8
802		2/	
802		2/	
802		2/	
803	1	26	35.5
803	2	0	0.0
803	3	1	1.7
804	1	0	0.0
804	2	2	3.4
804	3	13	19.1
805	1	28	40.0
805	2	46	59.2
805	3	23	31.7
806	1	38	52.4
806	2	16	26.2
806	3	2	3.5

-Continued-

Table 8. (p. 2 of 3)

Date	Drift	Catch	Mean CPUE
807	1	6	10.0
807	2	4	6.7
807	3	1	1.7
808	1	30	41.2
808	2	22	29.2
808	3	17	28.0
809		2/	
809		2/	
809		2/	
810	1	67	90.2
810	2	64	88.0
810	3	43	89.3
811	1	3/	
811	2	55	135.4
811	3	39	92.4
812	1	18	35.4
812	2	20	33.5
812	3	55	83.3
813	1	21	33.9
813	2	3	6.5
813	3	4	6.4
814	1	3	5.4
814	2	2	3.5
814	3	13	20.3
815	1	12	18.8
815	2	2	3.5
815	3	9	14.8
816		2/	
816		2/	
816		2/	
817	1	3	5.1
817	2	0	0.0
817	3	0	0.0
818	1	3	5.2
818	2	4	7.0
818	3	4	5.9
819	1	2	3.3
819	2	5	8.5
819	3	10	17.1
820	1	13	20.2
820	2	4	6.8
820	3	3/	
821	1	3/	
821	2	0	0.0
821	3	0	0.0
822	1	7	11.3
822	2	1	1.6

-Continued-

Table 8. (p. 3 of 3)

Date	Drift	Catch	Mean CPUE
822	3	19	31.3
823		2/	
823		2/	
823		2/	
824	1	3	4.8
824	2	10	15.9
824	3	6	10.8
825	1	0	0.0
825	2	6	10.2
825	3	3/	
826	1	4	6.8
826	2	7	13.7
826	3	2	3.8
827	1	11	16.3
827	2	11	17.3
827	3	4	6.8

1/ Mean CPUE is calculated from the CPUE of 3 individual stations per drift

2/ No fishing - regular day off

3/ No fishing - weather or other reason

Table 9. Noatak River seasonal test fishing CPUE indices, mean CPUE, and percent by drift period (time of day), 1987.

Drift Period	CPUE Indices	No. Drift Periods	Seasonal Mean CPUE 1/	%
1 (1200)	617.4	27	22.9	35.7
2 (1800)	610.4	31	19.7	30.7
3 (2400)	626.0	29	21.6	33.6
Total	1853.8	87	21.4	100.00

1/ Calculated by weighting CPUE information from each drift time period equally.

Table 10. Noatak River seasonal test fishing CPUE indices, mean CPUE, and percent by station, 1987.

Station	CPUE Indices	No. Station Drifts	Seasonal Mean CPUE 1/	%
A	2234.6	87	25.7	40.4
B	1471.7	86	17.1	26.9
C	1766.5	85	20.8	32.7
Total	5472.8	258	21.2	100.00

1/ Calculated by weighting CPUE information from each station equally.

Table 11. Noatak River test fishing cumulative mean drift CPUE, 1987-1988. 1/

Date	1987	1988
719		17.35
720		77.28
721		93.82
722		93.82
723	15.0	129.74
724	25.3	129.74
725	112.5	160.81
726	112.5	171.19
727	227.2	172.89
728	270.1	200.91
729	317.6	200.91
730	389.6	207.58
731	438.2	214.40
801	474.0	342.29
802	474.0	404.92
803	511.2	585.20
804	533.7	813.45
805	664.6	952.02
806	746.7	952.02
807	765.1	952.02
808	863.5	1067.80
809	863.5	1074.83
810	1131.0	1096.14
811	1358.8	1287.17
812	1511.0	1512.97
813	1557.8	1512.97
814	1587.0	1512.97
815	1624.1	1534.35
816	1624.1	1556.38
817	1629.2	1608.63
818	1647.3	1856.03
919	1676.2	2012.27
820	1703.2	2012.27
821	1703.2	2086.36
822	1747.4	2104.14
823	1747.4	2146.24
824	1778.9	2186.70
825	1789.1	2202.50
826	1813.4	
827	1853.8	

1/ Cumulative CPUE calculated by summation of mean drift CPUE indices

Table 12. Cumulative proportions of Noatak River test fish CPUE indices, 1987-1988, and Kotzebue commercial catch and CPUE, 1988.

	Test Fish Cum Prop CPUE		Comm Catch	Comm CPUE
Date	1987	1988	1988	1988
7/19		0.0079	0.11	0.18
7/20		0.0351		
7/21		0.0426		
7/22		0.0426	0.20	0.30
7/23	0.0081	0.0589		
7/24	0.0136			
7/25	0.0607	0.0730		
7/26		0.0777	0.27	0.37
7/27	0.1226	0.0785		
7/28	0.1457	0.0912		
7/29	0.1713		0.40	0.48
7/30	0.2102	0.0942		
7/31	0.2364	0.0973		
8/01	0.2557	0.1554		
8/02		0.1838	0.48	0.55
8/03	0.2758	0.2657		
8/04	0.2879	0.3693		
8/05	0.3585	0.4322		
8/06	0.4028		0.67	0.66
8/07	0.4127			
8/08	0.4658	0.4848		
8/09		0.4880		
8/10	0.6101	0.4977	0.77	0.72
8/11	0.7330	0.5844		
8/12	0.8151	0.6869		
8/13	0.8403		0.89	0.84
8/14	0.8561			
8/15	0.8761	0.6966		
8/16		0.7066	0.93	0.88
8/17	0.8788	0.7304		
8/18	0.8886	0.8427		
8/19	0.9042	0.9136	0.97	0.92
8/20	0.9188			
8/21	0.9188	0.9473		
8/22	0.9426	0.9553		
8/23		0.9745	0.99	0.95
8/24	0.9596	0.9928		
8/25	0.9651	1.0000		
8/26	0.9782		0.99	0.97
8/27	1.0000			

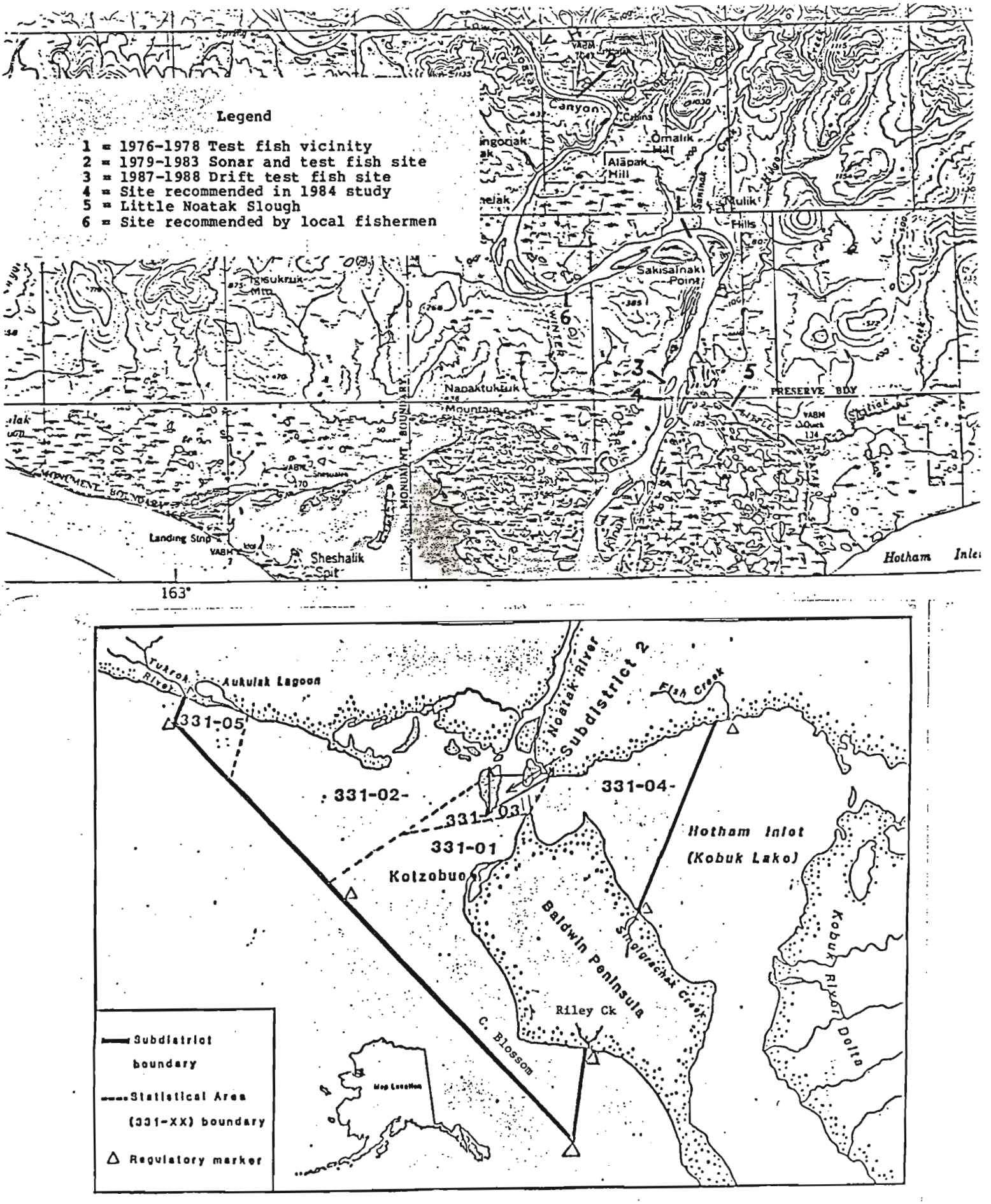

Figure 1. Noatak River test fishing sites and Kotzebue Sound commercial salmon fishing subdistricts.

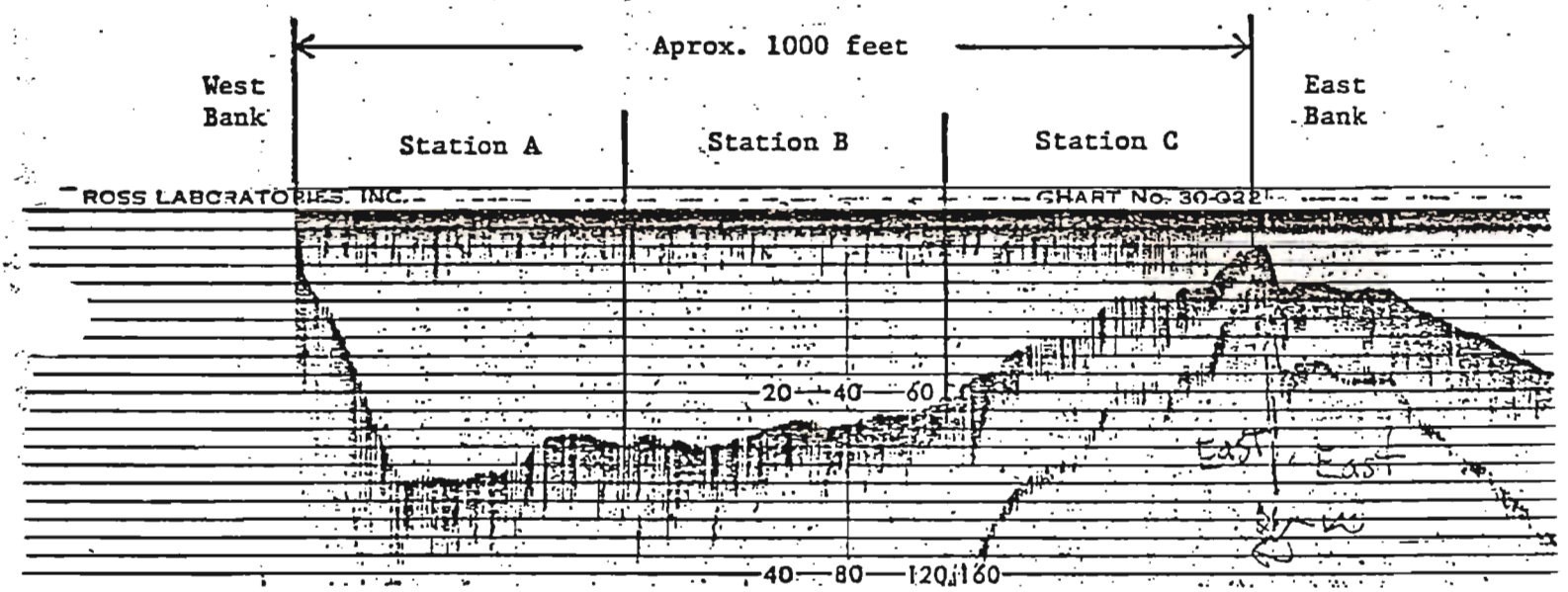

Figure 2. Bottom profile of drift test fish site, 1987.

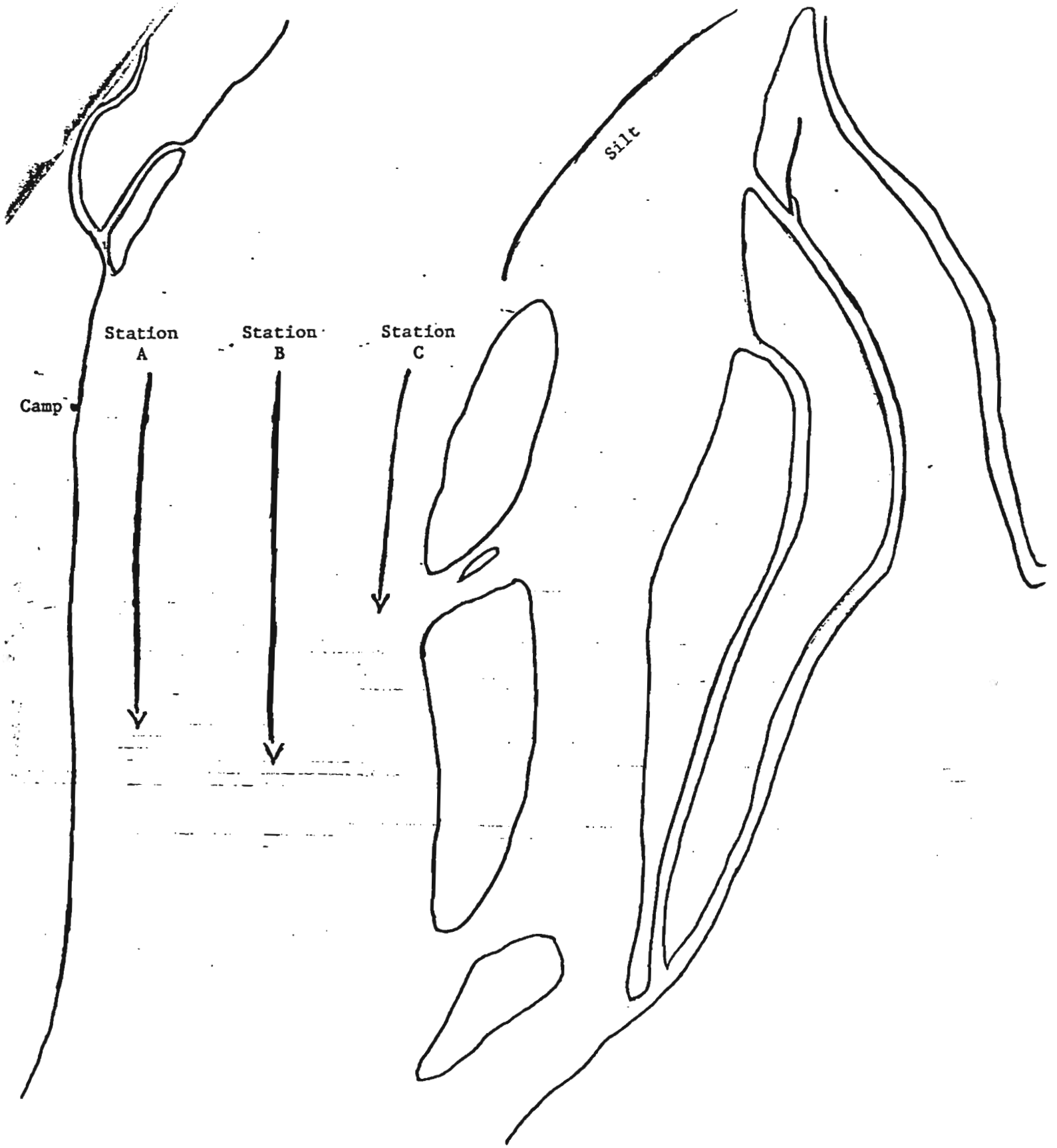

Figure 3. Drifting stations used in the 1987-1988 Noatak River test fishery.

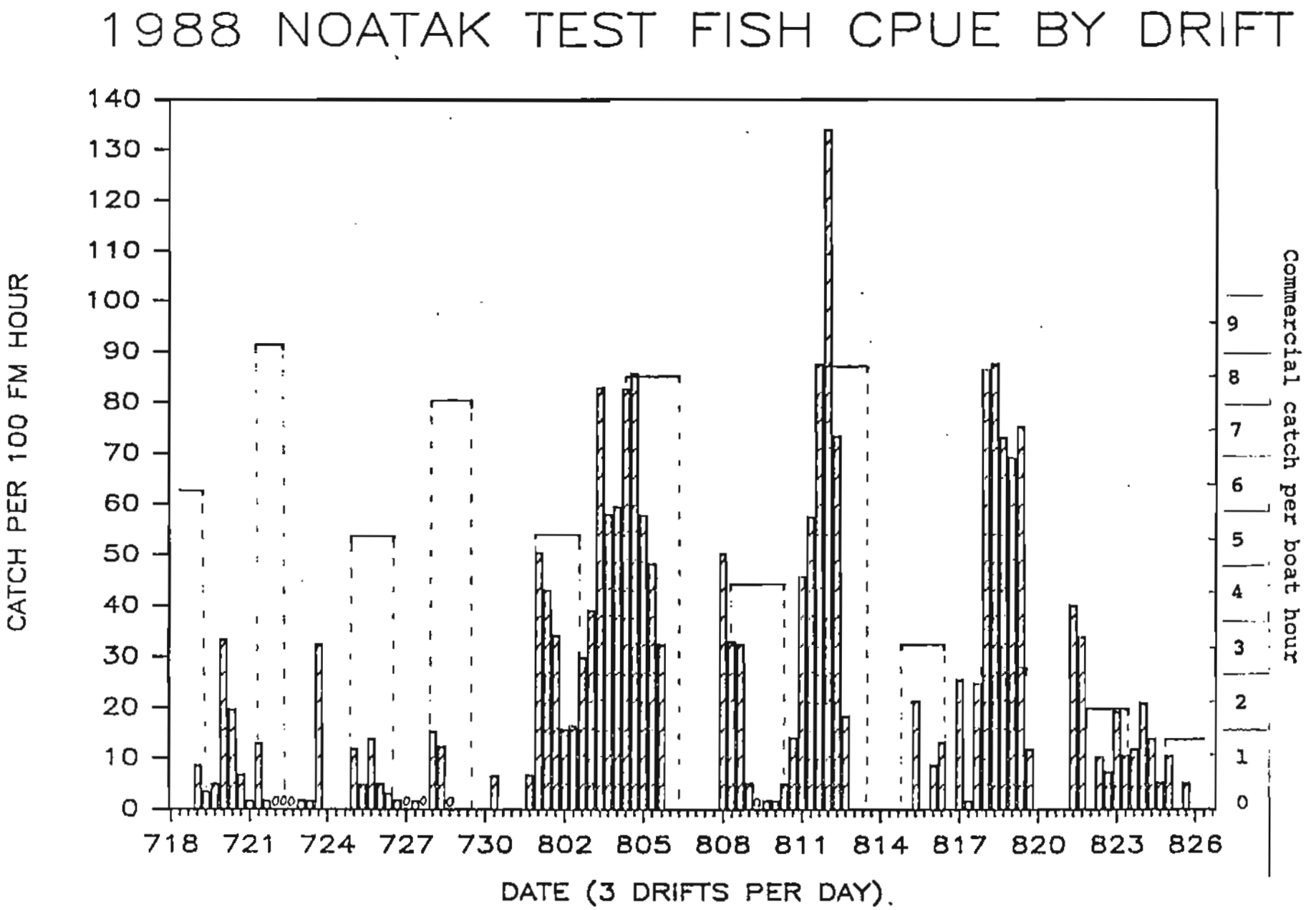

Figure 4. Noatak River test fish CPUE (histogram) and commercial CPUE (——), 1988.

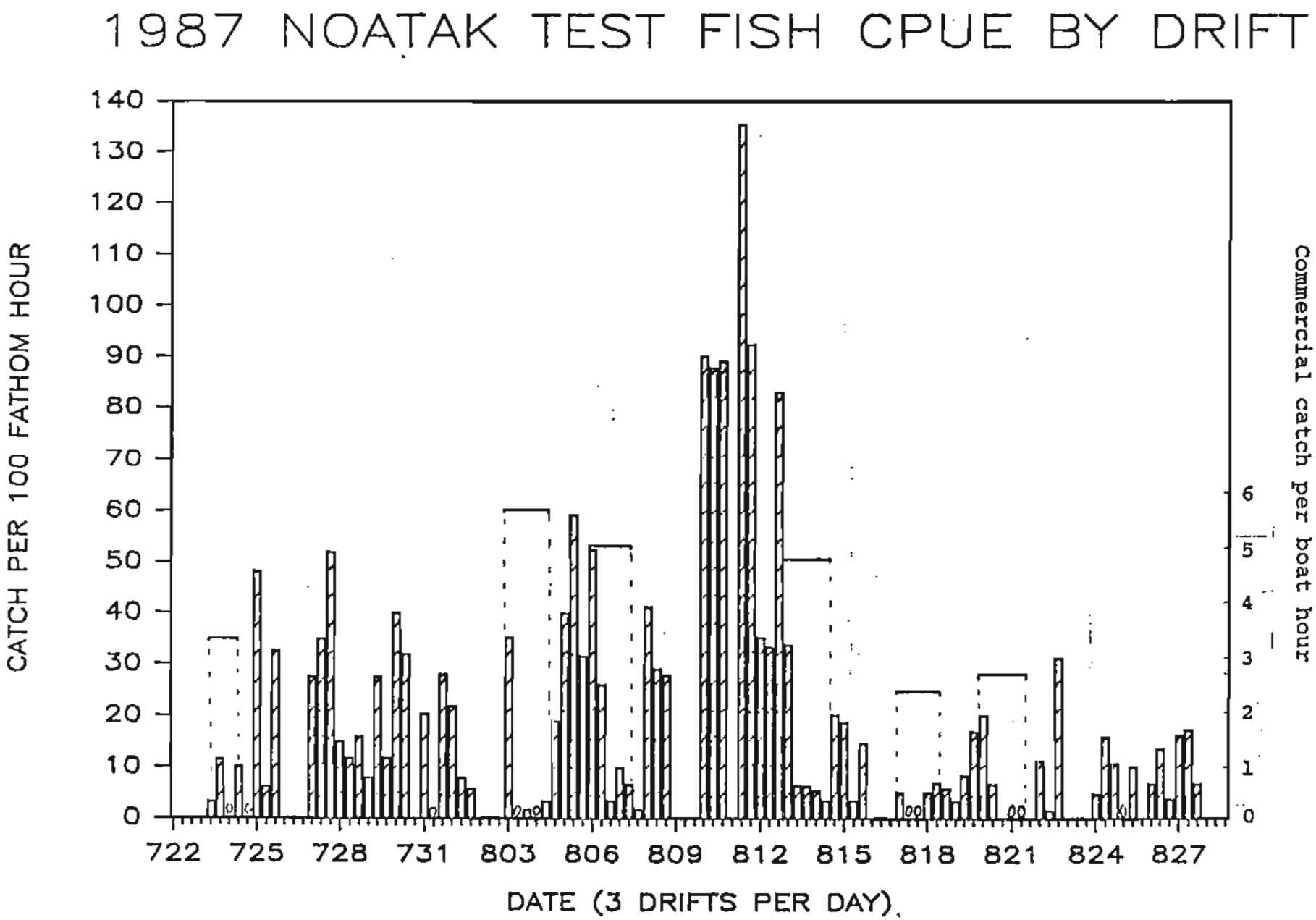

Figure 5. Noatak River test fish CPUE (histogram) and commercial CPUE (——), 1987.

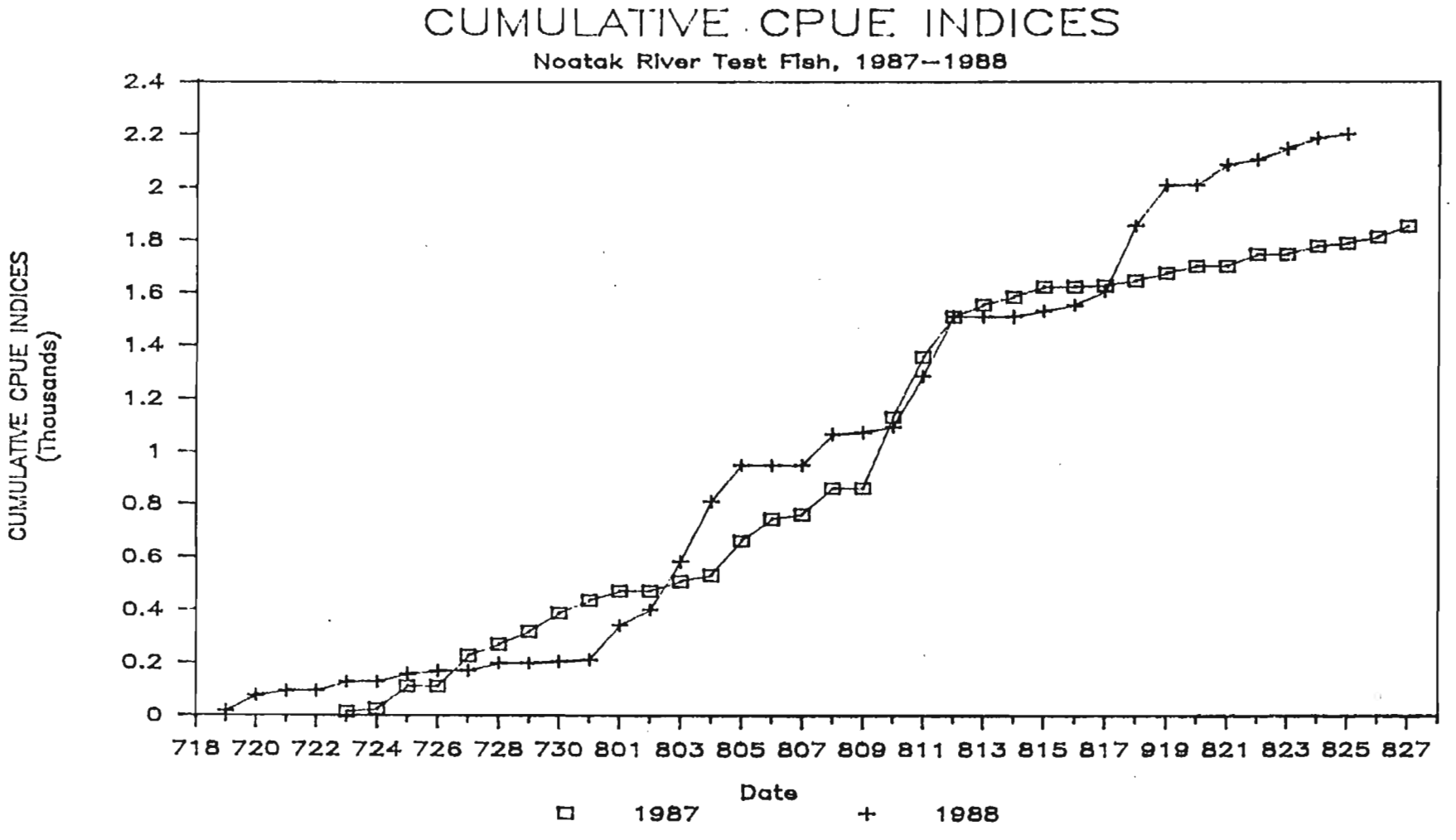

Figure 6. Cumulative mean drift CPUE indices, Noatak River test fish, 1987-1988.

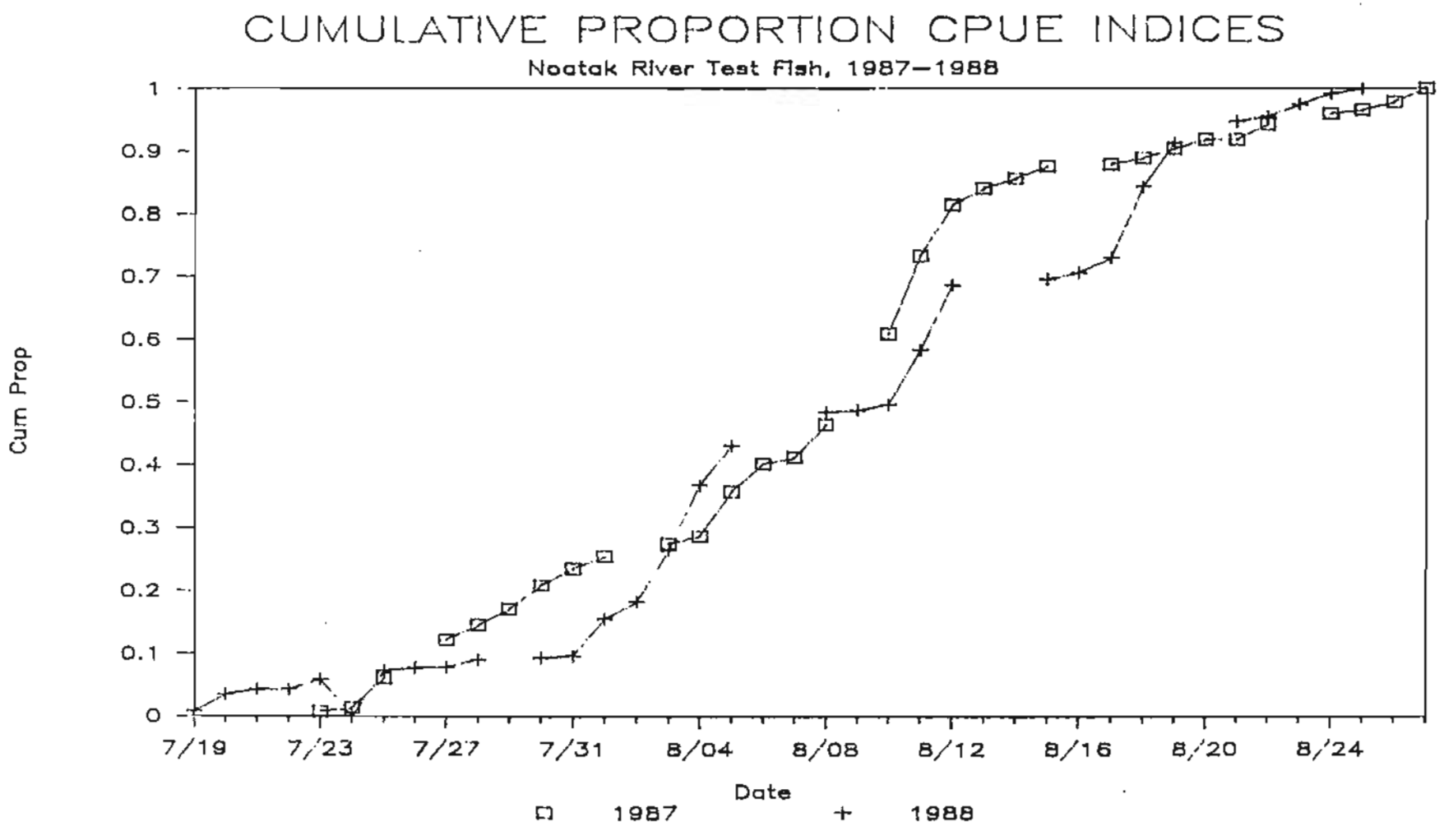

Figure 7. Cumulative proportion of seasonal total CPUE indices, Noatak River test fish, 1987-1988.

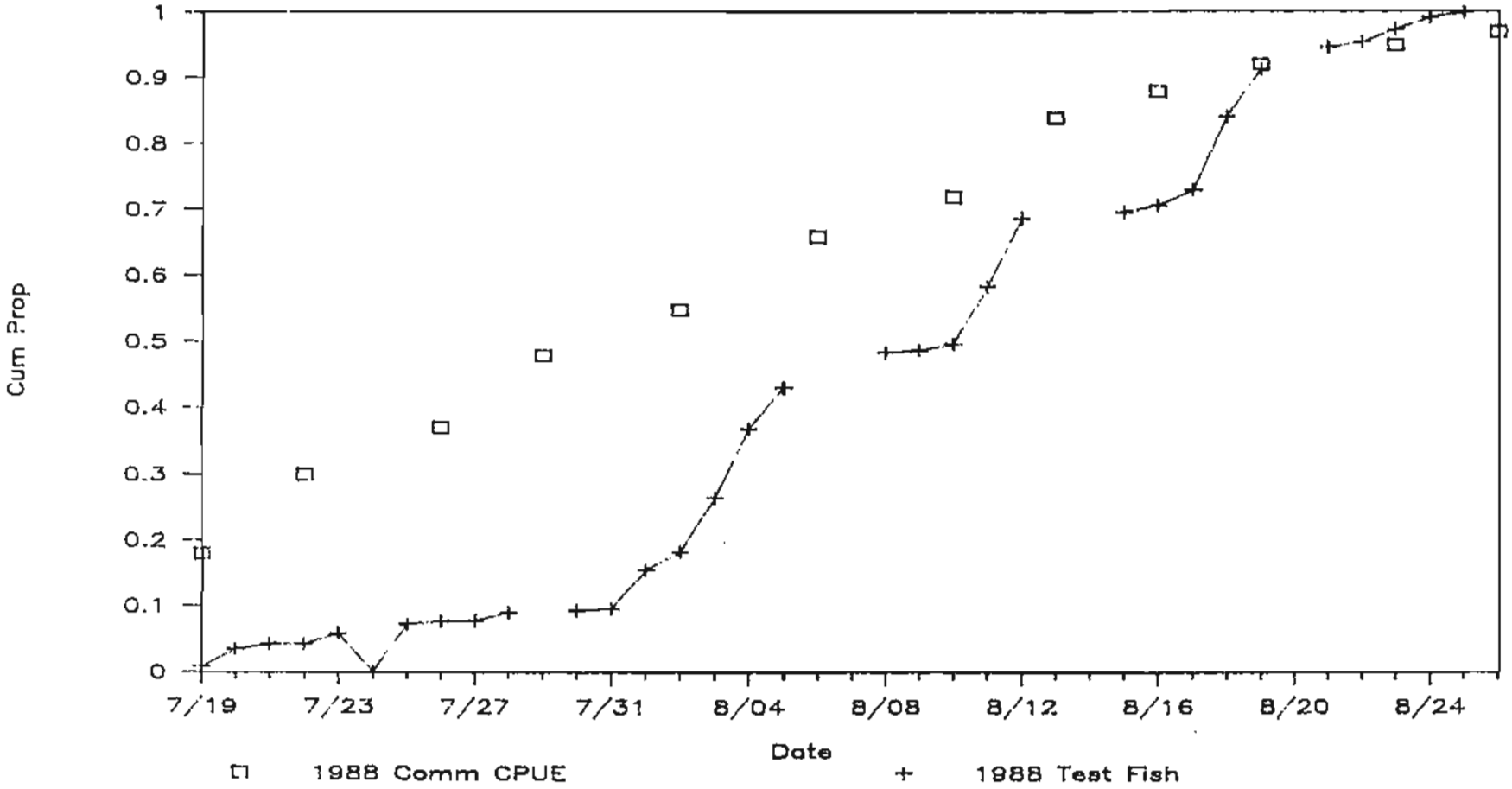

Figure 8. Cumulative proportion of seasonal total Noatak River test fish CPUE indices and Kotzebue commercial CPUE, 1988.